US Army Corps of Engineers
Portland District

NERC Compliance

An NWP Perspective

Robert Ford
Reliability Compliance Program Manager

Operations Division
Portland District
US Army Corps of Engineers

09 August 2012

US Army Corps of Engineers
Portland District

Northeastern Blackout
August 14, 2003

On August 14, 2003, large portions of the Midwest and Northeast United States and Ontario, Canada, experienced an electric power blackout. The outage affected an area with an estimated 50 million people and 61,800 megawatts (MW) of electric load in the states of Ohio, Michigan, Pennsylvania, New York, Vermont, Massachusetts, Connecticut, New Jersey and the Canadian province of Ontario. The blackout began a few minutes after 4:00 pm Eastern Daylight Time (16:00 EDT), and power was not restored for 4 days in some parts of the United States. Parts of Ontario suffered rolling blackouts for more than a week before full power was restored. Estimates of total costs in the United States range between $4 billion and $10 billion (U.S. dollars). In Canada, gross domestic product was down 0.7% in August, there was a net loss of 18.9 million work hours, and manufacturing shipments in Ontario were down $2.3 billion (Canadian dollars).

Excerpt from the “Final Report on the August 14, 2003 Blackout in the United States & Canada”, from the U.S.-Canada Power System Outage Task Force, dated April 2004.

US Army Corps of Engineers
Portland District

Northeast Blackout
What Happened?

- **Started with 3 Generators and 4 345kV Transmission Lines**
  - **Generators – Unscheduled Shutdowns**
    - **Conesville Unit 5 (375 MW) – 12:05 PM**
    - **Greenwood Unit 1 (785 MW) – 1:14 PM**
    - **Eastlake Unit 5 (597 MW) – 1:31 PM**
  - **Transmission**
    - **Stuart – Atlanta – 345kV – Brush Fire – 2:02 PM**
    - **Harding-Chamberlain – 345kV - Unknown – 3:05 PM**
    - **Hanna-Jupiter – 345kV – Vegetation Contact – 3:32 PM**
    - **Star-South Canton – 345kV – Unstable – 3:41 PM**
- **The Event then cascaded to affect major portions of the Northeastern US and parts of Canada.**

US Army Corps of Engineers
Portland District

Northeast Blackout
The Result

NEW YORK CITY

TORONTO, CANADA

THE NATION'S NEWSPAPER 50 CENTS

USA TODAY

NO. 1 IN THE USA

'One good day' at the PGA
Mickelson shares lead, takes aim at his 1st major ■ 1, 8-9C

Married — with cameras
MTV moves in with pop newlyweds Simpson & Lachey ■ 1-2E

Reality TV: Jessica Simpson with husband Nick Lachey of 98 Degrees.

Blackout misery

50 million affected in Northeast and beyond as power grid fails

Transportation Many 'wait it out,' by air and land ■ 4A | Scenes Moms in labor, cars stuck in car washes ■ 5A | Impact Offices close, ATMs idle, cellphones jam ■ 1B

Brooklyn Bridge: Thousands of commuters in New York took to their feet Thursday evening after a major power outage hit the city and much of the Northeast.

Outage spawns rush-hour chaos from Detroit eastward

By Charisse Jones and Tom Vanden Brook, USA TODAY

The biggest blackout in U.S. history crippled major metropolitan areas in the Northeast and Midwest on Thursday by shutting down trains, airports, traffic and cooling systems.

In cities from New York to Detroit and north into Canada, tens of thousands of people found themselves trapped in subways, systems and elevators. Workers emptied sweltering buildings and flooded city streets. Airports canceled hundreds of flights and stranded thousands of fliers. Street cars stalled in Toronto. Commuters jammed platforms awaiting trains that wouldn't come. Darkened traffic lights caused rush-hour gridlock.

As many as 50 million people live in the affected areas where a chain of events caused a power grid to fail.

The cause of the outages, which began shortly after 4 p.m. ET, was disputed. Canadian officials pointed to problems in U.S. power plants. New York Gov. George Pataki said the problem began in Canada.

President Bush said he would order a review of "why the cascade was so significant."

At dusk, lights began to flicker in parts of New York and New Jersey. some services were restored and most flights resumed. But full restoration of power was not expected until today, and it could take days to assess whether there was serious damage. Governors declared states of emergency in New York and New Jersey.

Around the region:

► In Ottawa late Thursday, looting was reported, according to Reuters news service.

► In Michigan, where more than 2 million people endured a night without light or air conditioning, officials said power might not be restored for days.

► In Cleveland, 1.5 million residents ran low on water because equipment couldn't tap Lake Erie. At least three suburbs were out of water.

Cities, states and provinces most affected

By Adrienne Lewis, USA TODAY

Geraldyne Bryant, a building housekeeper in Cleveland, was trapped on an elevator for five hours. "I should at least get a day off for this," she said later.

► Flights at six airports — Kennedy, LaGuardia, Newark, Cleveland, Toronto and Ottawa — were grounded for hours. And nine nuclear power plants on the East Coast shut down.

For many nervous city-dwellers, there was the fright of terrorism. But federal officials dismissed that possibility.

In New York, the blackout evoked memories of the Sept. 11 attacks. "This is really spooky. It throws you back to 9/11," said Digna Grant, 22, after fearing a stranded subway train in Times Square.

Though the East is no stranger to blackouts, the last major one in the United States occurred Aug. 10, 1996, when 7.5 million people in nine Western states lost power for up to 16 hours. The worst blackout occurred in 1965 when 30 million people lost power. An outage in New York City in 1977 left 9 million people without electricity for up to 25 hours.

Contributing: Jones reported from New York City; Vanden Brook from McLean, Va.

US Army Corps of Engineers
Portland District

Northeast Blackout
Root Causes

- **Inadequate System Understanding**
  - **Failure to assess and understand the inadequacies of the power system and to even have systems on-line to evaluate the system.**
- **Inadequate System Awareness**
  - **Didn't understand the deteriorating condition of the power system. Some detection systems were off-line at the time.**
- **Inadequate Tree Trimming**
  - **Failure to manage growth in transmission right of ways.**
- **Inadequate Real-time Contingency Diagnostic Support**
  - **Failure of Interconnected Grid Reliability Organizations to provide assistance to the system. In fact, one major provider opened its lines to isolate it from the disturbance.**

US Army Corps of Engineers
Portland District

Northeast Blackout
Relevant Quotes

“Our investigation leads to the conclusion that electric reliability has been seriously compromised by the fragmented and ineffective regulation of the electric transmission system.” Michigan Public Service Commission

“The FirstEnergy operator still seemed unsure about exactly what was happening.” NERC Analysis of the 2003 Northeast Blackout

``We are a major superpower with a third-world electrical grid.'' Gov. Bill Richardson of New Mexico

``If there had been more lines available at the time this event occurred, it's possible they could have absorbed the load and kept the failure from spreading.'' Jack Hawks, vice president for planning of the Electric Power Supply Association

US Army Corps of Engineers
Portland District

Enter The Energy Policy Act of 2005

- **Energy Policy Act of 2005**
  - **Enacted, by Congress, in response to the 2003 Northwest Blackout**
  - **Calls for sweeping standards designed to make the Bulk Electric System more robust and reliable**
  - **Intended to be an industry "partnership" process**

US Army Corps of Engineers
Portland District

What is the Bulk Electric System?

- **The Bulk Electric System (BES):**
  - **More than $1 trillion (U.S.) in asset value**
  - **More than 200,000 miles—or 320,000 kilometers (km) of transmission lines operating at 230,000 volts and greater.**
  - **More than 950,000 megawatts of generating capability.**
  - **Nearly 3,500 utility organizations serving well over 100 million customers and 283 million people.**

- **NERC Reliability Compliance Standards deal with Generation and Transmission Assets that are connected to the Bulk Electric System (BES).**

Compliance Organization

US Army Corps of Engineers
Portland District

Federal Energy Regulatory Commission (FERC) (Government Entity)

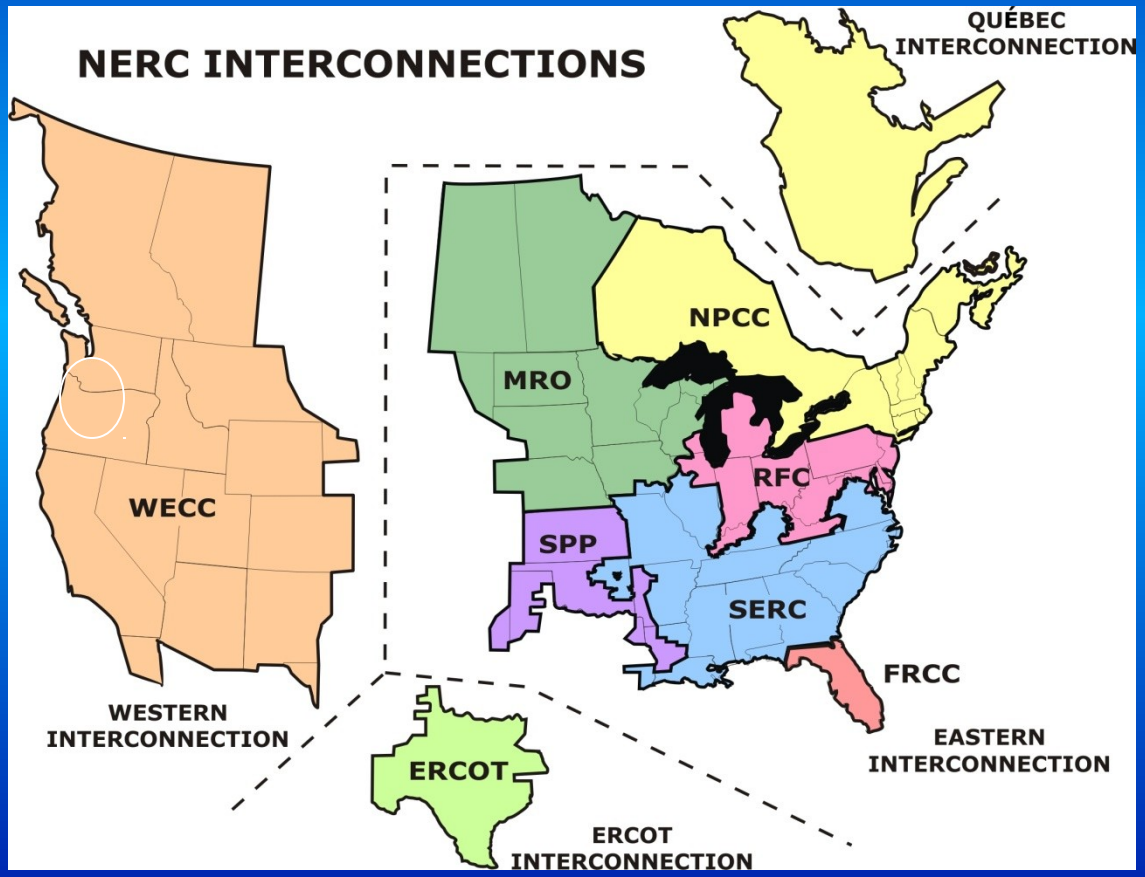
North American Electrical Reliability Corporation (NERC) (Private Entity)

Western Electrical Coordinating Council (WECC) (Private Entity)

NWP, NWS, NWW, BPA, USBR, PGE, etc. (US!)

US Army Corps of Engineers
Portland District

Regional Reliability Organizations



US Army Corps of Engineers
Portland District

NWD Registered Entities
Reliability Compliance Program Managers (RCPMs)

- **Northwest Division**
  - Portland District – Robert Ford
  - Seattle District – Matt Walden
  - Walla Walla District – Robert Wall
  - Omaha District – Gary Hinkle
  - Kansas City District – Christopher Sickler

US Army Corps of Engineers
Portland District

NERC Reliability Standards

- Resource & Demand Balancing (BAL)
  - Sets standards and procedures for the balancing of load with that of demand including: Disturbance Control, Contingency Reserve, Frequency Response, Automatic Generation Control.
- Communications (COM)
  - Ensures that all players associated with the Generation to Transmission Mission have adequate tools and techniques for efficient communication.
- Critical Infrastructure Protection (CIP)
  - Sets down standards for protection of physical and logical access to cyber assets determined to be critical to the Bulk Electric System.

US Army Corps of Engineers
Portland District

NERC Reliability Standards

- Emergency Preparedness & Operations (EOP)
  - Preparation & Planning for “less than normal” conditions including: Emergency Operations Planning & Preparation, Load Shedding Plans, Disturbance Reporting, System Restoration Plans (Blackstart), Loss of Control Centers
- Facilities Design & Connections (FAC)
  - Establishes connection & performance requirements for Transmission and Generator Owners including Facility Ratings, Vegetation Controls & Maintenance, Operating Limits, New Facility Planning

US Army Corps of Engineers
Portland District

NERC Reliability Standards

- Interchange Scheduling & Coordination (INT)
  - Deals with coordination and communication between regional energy power system entities
- Interconnection Reliability Operations & Coordination (IRO)
  - Mandates planning and coordination of transmission and generation operations of BES Assets
- Modeling, Data & Analysis (MOD)
  - Provides requirements for the documentation, modeling and forecasting of BES Assets

US Army Corps of Engineers
Portland District

NERC Reliability Standards

- Nuclear (NUC)
  - Requires coordination between Nuclear Plant Generator Operators and Transmission Entities.
- Personnel Performance, Training & Qualifications (PER)
  - Provides standards for the staffing, qualifications & training of System and Transmission Operators
- Protection & Control (PRC)
  - Provides requirements for installation, coordination and communication of BES Asset Protection Circuits
  - Circuit Breakers, relays, etc.

US Army Corps of Engineers
Portland District

NERC Reliability Standards

- Transmission Operations (TOP)
  - Provides operational & coordination requirements for Transmission System Operators
- **Transmission Planning (TPL)**
  - Provides system performance & self-assessment requirements for Transmission System Operators
- Voltage & Reactive (VAR)
  - Provides operational, coordination and communication requirements for BES Transmission and Generation Assets with respect to voltage control

US Army Corps of Engineers
Portland District

NERC Reliability Standards

Possible interest to FPOM

- **Project Access**
  - **CIP – Restricts physical access to those individuals that have a verified need, training and identification verification.**
- **System & BiOP Operations & Planning**
  - **EOP – Sets definite procedures for System Restoration, Emergency Operations & Load Shedding**
  - **IRO – Sets down requirements and procedures for advanced date and current day coordination of operations of the BES.**
  - **MOD - Requires model validation testing of generation units which, without proper planning, may be in conflict with seasonal passage criteria.**
  - **TOP – Sets requirements for Outage Coordination.**

Bottom Line: The NERC Standards adds yet another authority into the mix of agencies that determine the operating characteristics of Federal and Private generation assets in the Northwest.

Questions ????

US Army Corps of Engineers
Portland District